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Group work and the change of obstacles over time: The influence of learning style and group composition

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Abstract

It is through working in groups that students develop cooperative learning skills and experience. However, group work activity often leads students into a difficult experience, especially for first-year students who are not familiar with group work activities at university. This study explores obstacles faced by first year students during their group work activities. This study investigates whether a group of students with a similar learning style (homogeneous group) experience different obstacles compared to a group of students with a diverse learning style (heterogeneous group). In addition, to identify the difference, if any, between a group formed by a tutor and one where the students form the group themselves, tutor and self-allocated group allocations are explored. This study focuses on obstacles experienced by these students during group work activities. Using a sample of more than 200 students over a period of three years, the types and the changes of obstacles in different stages of group life are explored. The findings show that students experience obstacles which can be classified into personal and social, leadership and management, and task-related obstacles. Those obstacles were not static but increased over time. The study also investigates the impact of different method of forming groups and whether this impacted on obstacles experienced. Overall, different interventions prompted different patterns of obstacles development.

Keywords: group work, obstacles, method of forming group

Group work: do obstacles change over time?

In a higher education setting, group work activity has often been seen as a replacement or addition to traditional teaching methods (Chen et al., 2008; Hendry et al., 2005; Huxham and Land, 2000; Colbeck et al., 2000; Cohen, 1994). Group work has been accepted as a mechanism whereby students learn subjects whilst engaging in problem solving, observation and participation in collaborative activities (Sharan, 2010; Onwuegbuzie et al., 2009; Yazici, 2005; Bonwell and Eison,

1991). This approach focuses on students as being at the centre of activities and empowers them through the use of cooperative learning (Sharan, 2010; Johnson and Johnson, 1999). Ideally, group work can help students to develop a sense of 'team' by encouraging them to support each other's learning (Peterson and Miller, 2004; Slavin, 1995). As they learn to share, communicate ideas and listen to others' ideas, working in a group will help students in their learning and to experience new constructs for understanding (French and Kottke, 2013; Hillyard et al., 2010; Hillyard et al., 2010; Johnson and Johnson, 2002; Webb et al., 1995).

A number of factors make group work an attractive method for teaching and learning in higher education (Gregory and Thorley, 2013; Barth et al., 2007; Collier, 1980). As teaching pedagogies have shifted from teacher-centred learning to student-centred learning, this shift is characterised by the change from traditional rote-learning methods to styles in which students are more able to play an active role (Brockbank and McGill, 2007; Braxton et al., 2000) and engage in cooperative learning (Onwuegbuzie et al., 2009; Yazici, 2005; Johnson and Johnson, 1999). Johnson and Johnson (1986) and Sobral (1997) found evidence that students working in a group achieve higher levels of learning and retain information longer than students who work individually. By engaging in a cooperative learning environment, students are encouraged to take responsibility for their own learning and thus become critical thinkers (Sharan, 2010; Totten et al., 1991; Slavin, 1990).

Group work may, however, pose some potential problems (Hall and Buzwell, 2012; Wang, 2012; Micari and Drane, 2011; Stott-Ladd and Chan, 2008; Aggarwal and O'Brien, 2008; Hillyard et al., 2010; McCorkle et al., 1999). Group work can be an unpleasant experience due to a dysfunctional groups (Aggarwal and O'Brien, 2008; Dommeyer, 2007). Groups may experience communication problems if group members are diverse and come from different backgrounds. Several obstacles have been highlighted, such as 'free-ride' members (Hall and Buzwell, 2012; Aggarwal and O'Brien, 2008), social-comparison dilemmas (Micari and Pazos, 2014), management conflict (Stott-Ladd and Chan, 2008) and members' low participation (Li and Campbell, 2008). Burdett and Hastie (2009) found that individuals were more satisfied with group work when they perceived greater workload equality. Another problem is related with social comparison where students feel intimidated as they are less talented or less able to perform well than other (Dijkstra et al., 2008; Micari and Drane, 2011). Demographic differences also appear to have an impact on group work. Wilkinson and Fung (2002) found in a mixed-ethnicity group, some students tend to dominate discussion and activities. A similar pattern has been found with regard to gender, where males are more active than females (Lockheed et al., 1983). Overall, it can be concluded that groups that are able to overcome obstacles and function at the higher stages of development are more productive (Wheelan and Lisk, 2000).

While studies have discussed obstacles that hinder learning in group work, those obstacles are often seen as static and do not change over time. In fact, the obstacles may disappear or escalate while new obstacles appear as groups progress from one stage of group development to another. Without understanding how students work as a group and how they use resources on solving and negotiating obstacles at the expense of learning, their learning process may perhaps be impaired in some way. For that reason, there is a need to better understand the development pattern of different types of obstacles during group work.

Group works: the impact of the different method of forming groups on obstacles

While working in groups may facilitate and reinforce learning activities, the challenge of employing group work is in part about the way that those groups are formed. There are several ways of forming groups, but the most popular ones are these two. One, allowing students to choose their own group (self-selected group). Two, that the tutor allocates students to groups, randomly, that is, without taking into account any factors such as gender balance, background, age or whatever (Huxham and Land, 2010).

Despite the benefits offered by group work in supporting learning, there have been studies indicating negative experiences of working in a group (for example, Hall and Buzwell, 2012; Wang, 2012; Micari and Drane, 2011; Stott-Ladd and Chan, 2008; Aggarwal and O'Brien, 2008; Hillyard et al., 2010; McCorkle et al., 1999). Apparently, the use of group work may force students to spend more time and put more effort into overcoming obstacles than dealing with tasks and learning in a cooperative way. While many studies have been focused on obstacles, little attention has been given to the dynamic

nature of obstacles experienced by students during group work. In addition, there have been few studies examining the relationship between how groups are formed and the obstacles faced within each (Huxham and Land, 2010, Yazici, 2005).

It is argued here that students that have been tasked to work in a group that the tutor has formed, one which does not take into account any factors such as gender balance, background, age or whatever, (that is the group comprises students who have been randomly allocated), may find it difficult to perform in that group, especially in the early stages in introducing themselves to each other compared to self-selected groups. In self-selected groups, problems such as communication can be reduced, as members are more likely to be known to each other. The group often selects members based on their skills and capability that they believe will bring benefit to the group. Consequently, the self-selected group may experience fewer obstacles and a lower degree of difficulty than the group that has been formed by the tutor and which comprises students who have been randomly allocated.

Another common method that has been used to form groups is by attempting to 'engineer' groups according to certain characteristics (Yazici, 2005; Huxham and Land, 2010). Students process and learn new information in different ways, which may impact on their approach to group work activities. According to the concept of cooperative learning, having a variety of learning styles in a heterogeneous group has a positive impact on group work (for example, Slavin, 1987; 1995; Johnson and Johnson, 1989). The argument is that in a heterogeneous learning group, students may complement their skills and capability (Cheng et al., 2008; Slavin, 1991; Stevens and Slavin, 1995; Webb, 1982) which result in a better performance than that the homogeneous learning group. However, students in heterogeneous learning groups may potentially experience more, or different, obstacles than those in homogeneous learning groups (for example Monteil and Huguet, 1993, Dweck, 1986; Steel, 1997). Students may be confronted with others who have different learning approaches and styles. The differences may hinder engagement, resulting in a reduced ability to learn effectively. Students in heterogeneous learning groups may potentially experience social-comparison problems where they feel inferior as they view others as more competent (Mugny et al., 2001).

There is, therefore, a gap in the literature regarding the method of assigning students to groups and its impact on the obstacles that they face along the way. Therefore, there is a need to address the following research questions. One, do the obstacles change over time? Two, to what extent do the different methods of forming groups impact on the obstacles experienced? Three, does this vary when their learning style is taken into account? The following hypotheses are proposed.

H1a. Students in groups formed by the tutor on a random basis experience more obstacles than those in self-selected groups.

H1b. Students in groups formed by the tutor on a random basis experience greater difficulty than self-selected groups.

H2a. Students in groups comprising those with heterogeneous learning styles experience more obstacles than those in groups comprising those with homogeneous learning styles.

H2b. Students in groups comprising those with heterogeneous learning styles experience greater difficulty than those in groups comprising those with homogeneous learning styles.

Research method

In understanding the dynamic nature of obstacles, Tuckman's stage model (1965) that has been used for many years and is recognized to be key model of group development (Wheelan and Hochberger, 1996) is drawn on. Tuckman synthesizes a model of group development as a sequence of forming, storming, norming, and performing (Tuckman, 1965; Tuckman and Jensen, 1977). The stages of forming, storming and norming are relevant as they provide a recognisable frame for the analysis of group activity and obstacles over time. The performing stage is not addressed within this study as the focus is on obstacles, rather than task achievement. Interviews and surveys were conducted over a period of three years (2010 – 2012). The data were collected from students who joined ENTR101, a first-year introduction module at Lancaster University, UK which was designed to inspire and challenge students with entrepreneurship concepts within the field of business and management. The module was delivered over 10 weeks from January to March each year where students worked in groups consisting of 5 or 6 students.

The first stage of the research was undertaken by conducting interviews with a cohort of students in 2010. In total, there were 80 students who participated in the course. 30 students were selected using a random sampling method. The journey of these students was followed and interviews were conducted every two weeks for 10 weeks. During the interviews, we asked students the following questions such as 'how is it going with your group?' 'is everything going according to plan?' 'do you experience any problems?' 'have you been in trouble with the group?' If the students did not report any difficulties or obstacles, more detail questions were posed in relation with their perception on group performance, leadership, and the process during group work activity. Those questions aimed to explore any potential conflict that emerged during the activity. In total, 40 hours of data from the interviews were collected. The result of the analysis produced three categories of obstacles. Table 1 shows the mapping of the interview raw data to the obstacle categories.

TABLE 1 HERE

As a summary, the obstacles can be succinctly conceptualised by three formative constructs, (1) personal and social obstacles, (2) leadership and management obstacles, and (3) task-related obstacles. Personal and social obstacles refer to obstacles related to personality and interaction among students, such as lack of motivation, personality clash and difficulties in accepting others' opinions. Leadership and management obstacles refer to obstacles experience by students during the process of group work activities. This obstacle includes some technical issues related to managing the process such as leadership, communication and approaches to problem solving. The task-related obstacle relates to the content of the assignment. This is associated with limited knowledge and skills possessed by students as well as possible misunderstandings of the task objectives and mistakes during the process. From the interviews and the observation on the group work process, we found that the students spent the first two weeks in the forming stage. The meetings took a long time as the group started to understand the nature of assignments and different capabilities that are available in the group. The storming stage was normally started at week 3 and last until week 6 where the groups need to deliver their intermediate report. We defined the rest of the week as norming stage where the group reach consensus and start to work effectively toward the objective. Based on this construction of three categories of obstacles, a questionnaire was developed. We conducted surveys with a sample of 170 respondents over 2 years (85 students joining the module in 2011 and 85 students joining the module in 2012). The timing of the survey was in weeks 2, 5 and 8 during the 10 weeks module. In the survey, we used dichotomous variable (yes/no) to represent whether the students experience the obstacles. Using a five-point likert scale, we also asked them to indicate the degree of difficulty caused by each obstacle.

Two types of analysis were performed; the trend analysis of obstacle category and the measurement of obstacles incidences during group work. Using the trend analysis, the study compared the frequency of obstacle appearance in Tuckman's development stages. The second analysis measured the average number of obstacles experienced by students across the group development stages as well as the average degree of difficulties caused by each obstacle. Statistical tests were used to test the hypotheses. To test the hypotheses on how the method of assigning students into groups may have impacted the obstacles faced, we employed two experiments in two cohorts (2011 and 2012). In each cohort, students were divided into two workshops, each of which were grouped in different ways. The first experiment in 2011 allowed 40 students from the first workshop to choose their own groups and allocated another 45 students from the second workshop were randomly allocated into groups by the tutor. As a result, 4 self-selected groups and 5 randomly allocated groups were established. In the second experiment (2012), we assigned students based on their learning style. In total, there were 85 students in the class. We attempted to 'engineer' students into two groups. The homogeneous cluster included students who shared similar learning styles, while in the heterogeneous cluster more than one learning style was included. To determine the learning style, the Felder-Silverman learning style questionnaire was used (Felder and Silverman, 1988; Felder and Spurlin, 2005; Litzinger et al., 2007). This assessment identifies the students' dominant style on each style axis and returns a score from 1–10 to indicate the relative strength of this learning style. Felder-Silverman learning style defined four types of learning styles, active and reflective, sensing and intuitive, visual and verbal, sequential and global. As a result, there were 5 groups of students with heterogeneous learning styles and 4 groups of students with heterogeneous learning styles.

Findings

Do the obstacles changes over time?

Based on the 2011 and 2012 data, the analysis found a similar pattern of obstacle development where most of the obstacles increased in the final stages. In the forming stage, the number of obstacles was relatively low compared to that in other stages. The students were relatively new to each other and may have encountered different personal characteristics and backgrounds. During this stage, the students adjusted their behaviour accordingly, to adapt to the differences as well as to build their leadership capacity. Comparing the number of obstacles across different types of obstacles, the students suffered most from the leadership and management obstacles. Personal and social obstacles shows a similar development pattern with leadership and management obstacles where in the first two stages the number of obstacles were relatively stagnant but increased in the final stage. Task related obstacles were relatively low at the beginning but increased drastically in the second and the final stages.

FIGURE 1 and 2 HERE

To what extent do the different methods of forming groups have an impact on the obstacles experienced?

Table 2 shows the average number of incidences of obstacles experienced by the groups and by each student. On average, the students in groups formed by the tutor on a random basis experienced 17.04 obstacles in each stage compared to 17.74 obstacles experienced by the students in the self-selected groups in each stage. However, if we calculate the average number of obstacles experienced by the students, students in the groups formed by the tutor on a random basis experienced significantly fewer obstacles (0.38 incidences of obstacles per student) than students in the self-selected groups (0.44 incidences of obstacles per student). In the groups formed by the tutor on a random basis, the most frequent obstacle was personality clash (0.47 incidences of obstacles per student) while the most frequent problem in the self-selected groups was different approaches to problem solving (0.61 incidences of obstacles per student) and communication and time management (0.58 incidences of obstacles per student).

With regards to the role of learning style in terms of the make-up of the students in the group, students in groups comprising those with homogeneous learning styles experienced more obstacles compared to the students in groups comprising those with heterogeneous learning styles. On average, the homogeneous groups experienced 18.22 obstacles compared to 17.19 obstacles experienced by the heterogeneous groups. The number of obstacles experienced by students is relatively similar with the students in groups comprising those with homogeneous learning styles experiencing 0.40 incidences of obstacles per student and the students in groups comprising those with heterogeneous learning styles experiencing 0.43 incidences of obstacles per student. The obstacles experienced by the students in groups comprising those with homogeneous learning styles were relatively spread across the categories, with the highest incidences of obstacles being different approaches to problem solving (0.51 incidences of obstacles per student). For the students in groups comprising those with heterogeneous learning styles, two obstacles, namely lack of leadership and different approaches to problem solving were the most common obstacles witnessing 0.58 and 0.53 incidences of obstacles per student.

Whilst table 2 indicates that the students in groups formed by the tutor on a random basis experienced fewer obstacles per student than the self-selected groups, when analysing the degree of difficulty experienced (table 3), students from the groups formed by the tutor on a random basis suffered more than the students from the self-selected groups. Students in the groups formed by the tutor on a random basis experienced significant difficulty with regards to obstacles such as personality clash and lack of leadership. The self-selected groups reported a high degree of difficulty as a result of different approaches to problem solving. With regards to different learning styles, the students in groups comprising those with homogeneous learning styles experienced significant difficulties in terms of task related obstacles including lack of knowledge and lack of technical skills while the

students in groups comprising those with heterogeneous learning styles suffered from different approaches to problem solving.

TABLE 2 and 3 HERE

In this section, the findings on the trend of obstacles experienced by the group over time are presented. For each figure, the obstacles experienced by the students within the category are added. Figure 3 shows that in forming stage, the personal and social obstacles where the students in groups comprising those with homogeneous learning styles and the self-selected groups experienced fewer obstacles compared to the students in groups comprising those with heterogeneous learning styles and those in groups formed by the tutor on a random basis. This finding is in contrast to obstacles experienced by the students in groups comprising those with heterogeneous learning styles and groups formed by the tutor on a random basis where the number of obstacles is significantly higher. However, the obstacles experienced by the students in groups comprising those with homogeneous learning styles and those in a self-selected group escalated in the later stages while students in groups comprising those with heterogeneous learning styles and those in groups formed by the tutor on a random basis experienced a decline in the number of obstacles. In the final stage, the students in groups comprising those with homogeneous learning styles and self-selected groups experienced more obstacles than the students in groups comprising those with heterogeneous learning styles and the groups formed by the tutor on a random basis.

FIGURE 3 HERE

Examination of the leadership and management obstacles shows a mixed trend was apparent (Figure 4). With regards to the differences in learning style, both the students in groups comprising those with either a homogeneous or a heterogeneous learning style showed a similar trend where obstacles increased as the groups developed to the final stage. Comparing the groups formed by the tutor on a random basis and the self-selected groups, there are some interesting findings. At the beginning, the groups formed by the tutor on a random basis experienced more obstacles than the self-selected groups but as the groups progressed to the storming stage, the obstacles reduced drastically in the groups formed by the tutor on a random basis while the self-selected groups suffered from a significant increase in the number of obstacles.

FIGURE 4 HERE

The last figure (Figure 5) shows the development of task related obstacles where the number of obstacles increased drastically in the final stage. The pattern can be understood as the students must focus on accomplishing the task. Overall, the self-selected and students in groups comprising those with homogeneous learning styles experienced a higher number of obstacles compared to other groups.

FIGURE 5 HERE

By observing the trend of obstacles development across the three stages, some conclusions can be drawn. With regards to personal and social obstacles, the findings show that the pattern is rather complex where each type of group experienced a dynamic increase and decrease of obstacles. While the number of obstacles increased for the students in groups comprising those with homogeneous learning styles and those in the self-selected groups, the students in groups comprising those with heterogeneous learning styles and those in the groups formed by the tutor on a random basis experienced a decrease in their obstacles. With regards to leadership and management obstacles, the findings also showed that the number of obstacles increased over the three stages. However, the students in the self-selected groups and those in the groups formed by the tutor on a random basis

showed a significant dynamic change from the first to the stage stages. While for self-selected groups the number of obstacles increased dramatically, the students in the groups formed by the tutor on a random basis experienced the opposite, where the obstacles declined. This finding indicates that the way that the group is formed has an effect on the process. With regards to the task obstacles, the obstacles escalated in the final stage. While most of the groups experienced similar patterns, those students in the self-selected groups fared the worst compared to others.

Conclusion

This study explored the obstacles that appeared in each stage of group development. Using trend analysis, the study found that the obstacles experienced by the students increased as the groups progressed. Each stage had its own major obstacles, as the challenges and the context of each stage are different. The study found that most obstacles increase in the final stage with the leadership and management obstacles being among the most in terms of obstacles experienced. Two hypotheses regarding the impact that different methods in the forming groups may have had on the number and type of incidences of obstacles faced, namely, whether or not students in groups formed by the tutor on a random basis experience would experience more obstacles than those in groups that students themselves selected, that is, self-selected groups, and whether students in groups formed by the tutor on a random basis would experience greater difficulty than self-selected groups. It was hypothesised that students in groups formed by the tutor on a random basis would experience more obstacles than those in the self-selected groups. In fact, students in groups formed by the tutor on a random basis experienced fewer obstacles than those in self-selected groups. In addition, students in groups formed by the tutor on a random basis experienced more problematic obstacles than those in self-selected groups with regards to personality clashes and lack of leadership.

With regards to the second hypothesis, that is, whether students in groups comprising those with heterogeneous learning styles would experience more obstacles and face greater difficulty than those in groups comprising those with homogeneous learning styles, the results did not confirm that students in groups comprising those with heterogeneous learning styles experienced more obstacles than those in groups comprising homogeneous learning styles. Rather, those in groups comprising those with heterogeneous learning styles experienced fewer problematic task-related obstacles than those in groups comprising students with homogeneous learning styles. Students in groups comprising those with homogeneous learning styles suffered from obstacles such as lack of knowledge on the subject and technical skills. Based on this finding, it can be argued that the method of assigning students into groups determines the type and the development of obstacles experienced by students.

Limitations include that the study is based on the relatively small sample in a very specific context, namely, undergraduate students in their first year and within the field of business and management. Therefore, future work needs to look at more samples, such as those from later on during their undergraduate studies and also those at postgraduate level and also in different contexts, such as different disciplines and different cultural contexts, in order to support any generalisation of the findings. By further testing the findings in several different contexts, this can enrich our understanding about the factors that may influence the emergence and development of obstacles. There are also different ways of forming groups, and so future work needs to look at how different formations may or may not impact how students work in groups. It may also be fruitful to explore the role of intervention in supporting the learning process and in developing students' understanding of the group processes they are experiencing during group activities (Hillyard et al., 2010). Future studies could therefore usefully incorporate both the assessment of learning outcomes and the impact of students' prior understanding of group processes and obstacles in group activities.

The study described in this article explored the obstacles and their development during group work activities. The declining trend of obstacles experienced by the heterogeneous groups and the random group is interesting as they are assumed to encounter more diverse approaches due to differences in learning style and time needed to perform. The increased obstacles of the homogeneous and self-selected groups may be caused by the lack of complementary skills that were necessary for successful completion of the final stage. The contribution of this study is twofold. First, the study provides further empirical evidence that obstacles are not static but instead change over time during

group development (Jehn and Mannix, 2001). This work builds on and develops the literature on cooperative learning within groups (Slavin, 1990; Sharan, 1994; Johnson et al., 2010) by addressing not only outcomes but also by shedding light on the nature and type of those obstacles as they develop over time. Secondly, it helps us as lecturers/faculty when it comes to our decision making in terms of the choices open to us when it comes to the formation of groups in our classrooms. In addition to this, the study highlights potential obstacles to successful group processes and task completion at different stages of group life, which might perhaps be addressed by timely tutor, or institutional (Hillyard et al 2010), support and intervention.

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Table 1 shows the mapping of the interview raw data.

Respondents' response (illustrative evidence that were found across the stages)	First-order categories	Obstacles categories
'Our problem was 'X'. He did not show contribution. He never response our email, missed most of the group meetings .. he basically do not really care.'	Lack of motivation and commitment	Personal and social obstacles
'I found it was difficult to understand 'X'. He pretended to be clever, but actually his ideas were meaningless.'	Difficulty in accepting other ideas	
'I had a feeling that 'X' did not like me. I had no problem with her, yes .. she was a bit annoying.'	Personality clash	
'We are not moving and we always found it difficult to make a decision.'	Lack of leadership and direction	Leadership and management obstacles
'I was not sure that our approach was a right way. I didn't like it .. but, everybody agreed.'	Disagreement in approaching problem	
'If we sit together, we usually very quiet and did not act to accomplish the assignment. Group meeting is useless.'	Communication problem	
'I hate statistics. In our group, most of us do not understand the concept.'	Lack of knowledge on the subject	Task-related obstacles
'I felt unfair ... most of us worked hard for the project except him.'	Unfairness in task distribution	
'Our group have worked very hard but we still found it difficult to move forward. We don't know how to work with the SPSS.'	Lack of technical skills	

Table 2. Obstacles incidences in three development stages

Type of obstacles	Tutor-allocated group (45)			Self-selected group (40)			Homogeneous learning group (45)			Heterogeneous learning group (40)		
	A	B	C	A	B	C	A	B	C	A	B	C
Personal and social obstacles												
Lack of motivation	31.00	10.33	0.23	47.00	15.67	0.39	52.00	17.33	0.39	52.00	17.33	0.43
Feeling unfairness and lost interest	46.00	15.33	0.34	50.00	16.67	0.42	48.00	16.00	0.36	42.00	14.00	0.35
Personality clash	63.00	21.00	0.47	41.00	13.67	0.34	52.00	17.33	0.39	46.00	15.33	0.38
Leadership and management obstacles												
Lack of leadership	60.00	20.00	0.44	52.00	17.33	0.43	60.00	20.00	0.44	69.00	23.00	0.58
Different approach to problem	61.00	20.33	0.45	73.00	24.33	0.61	69.00	23.00	0.51	64.00	21.33	0.53
Communication and time management	60.00	20.00	0.44	69.00	23.00	0.58	62.00	20.67	0.46	56.00	18.67	0.47
Task-related obstacles												
Lack of knowledge on the subject	44.00	14.67	0.33	48.00	16.00	0.40	43.00	14.33	0.32	44.00	14.67	0.37
Unfairness in task distribution	46.00	15.33	0.34	52.00	17.33	0.43	49.00	16.33	0.36	48.00	16.00	0.40
Lack of technical skills	49.00	16.33	0.36	47.00	15.67	0.39	57.00	19.00	0.42	43.00	14.33	0.36
Average	17.04		0.38	17.74		0.44	18.22		0.40	17.19		0.43

Note: Column A: total number of obstacle incidences in three development stages; Column B: Average number of obstacles incidences in each stage; Column C: Obstacles incidences per student

Table 3. Level of difficulty experienced by students

Type of obstacles	Tutor-allocated group (45)		Self-selected group		T-test	Homogeneous learning group (45)		Heterogeneous learning group (40)		T-test
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Personal and social obstacles										
Lack of motivation	2.49	1.23	2.03	.98	1.23	2.14	1.02	2.52	1.20	1.23
Feeling unfairness and lost interest	2.04	.56	2.21	.76	1.56	2.67	.78	2.20	1.01	1.40
Personality clash	4.01	1.59	2.10	.84	4.97**	2.10	.91	1.98	.78	1.23
Leadership and management obstacles										
Lack of leadership	3.23	1.02	2.27	.75	3.01*	2.50	1.24	2.89	.95	1.61
Different approach to problem	2.30	.41	4.06	1.86	4.50**	2.30	.96	4.02	1.02	4.23**
Communication and time management	1.89	.43	2.24	.98	1.02	1.90	.56	2.02	.65	1.09
Task-related obstacles										
Lack of knowledge on the subject	2.02	.76	2.56	.45	1.90	3.90	1.11	2.01	0.86	3.76**
Unfairness in task distribution	2.05	.89	2.75	.90	1.87	2.01	.96	2.44	1.04	1.30
Lack of technical skills	2.98	1.02	3.14	1.24	2.14	3.56	1.08	2.10	.96	3.44*

Figure 1. Trend of obstacles in 2011 study

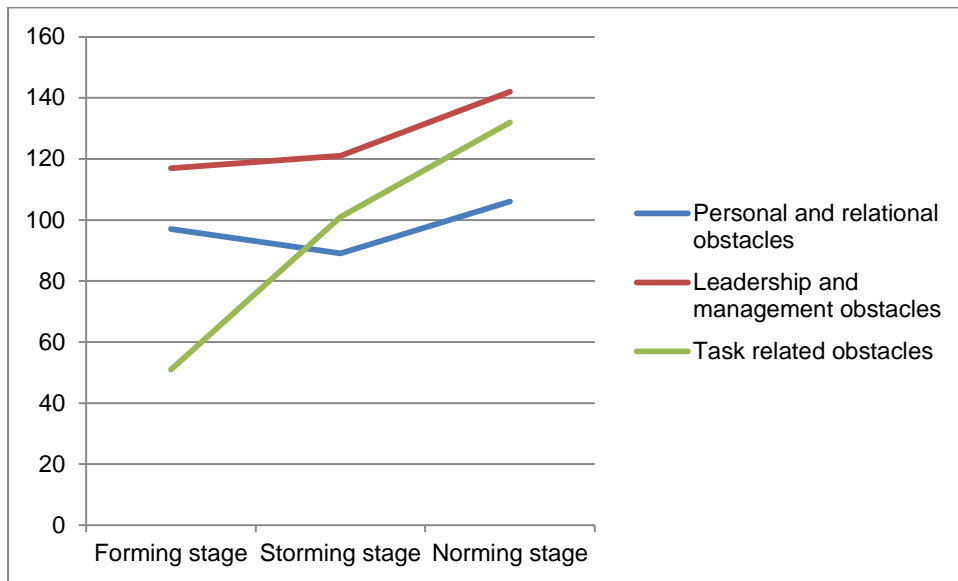


Figure 2. Trend of obstacles in 2012 study

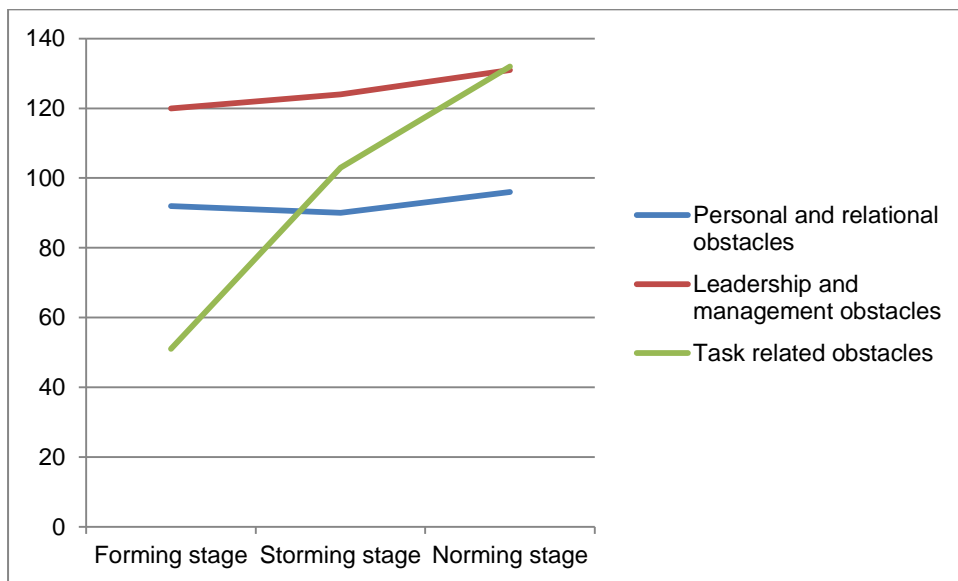


Figure 3. Trend of personal and social obstacles across three stages

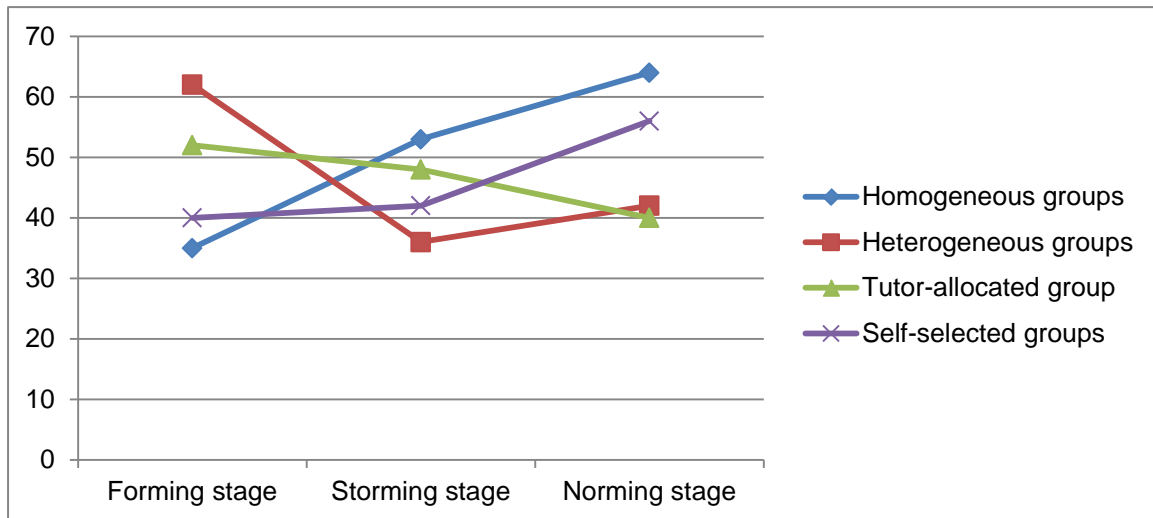


Figure 4. Trend of leadership and management obstacles across three stages

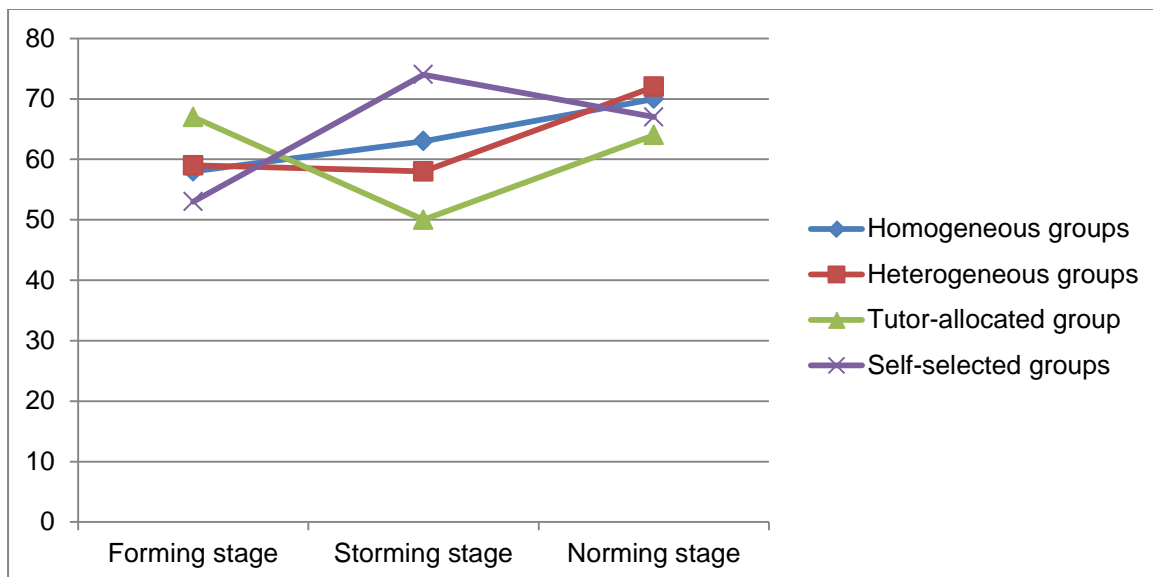


Figure 5. Trend of task-related obstacles across three stages

